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**FINAL CONSTRUCTION QUALITY ASSURANCE PLAN,
REMEDATION AREA 5, OFFSHORE CAPPING
PACIFIC SOUND RESOURCES SUPERFUND SITE
MARINE SEDIMENTS UNIT**

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ABBREVIATIONS AND ACRONYMS

ASTM	American Society for Testing and Materials
CERCLA	Comprehensive Environmental Restoration, Compensation and Liability Act
CMP	Cleanup Management Plan
CO	Contracting Officer
COR	Contracting Officer's Representative
Corps	U.S. Army Corps of Engineers
CQAP-RA5	Construction Quality Assurance Plan for Remediation Area 5
CQC	Contractor Quality Control
CSL	cleanup screening level
DCQCR	Daily Construction Quality Control Report
DGPS	Differential Global Positioning System
DMMO	Dredged Material Management Office
DMMP	Dredged Material Management Program
DMMU	dredged material management unit
DMSMART	Dredged Material Spatial Management Analysis Records Tool
DNR	Department of Natural Resources (Washington State)
Ecology	Department of Ecology (Washington State)
EDC	Engineering During Construction
EPA	U.S. Environmental Protection Agency
HPAH	high-molecular-weight PAH
LPAH	low-molecular weight PAH
MLLW	mean lower low water
MSU	Marine Sediments Unit
OMMP	Operation, Maintenance, and Monitoring Plan
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCDD	polychlorinated dibenzodioxin
PCDF	polychlorinated dibenzofuran
PM	USACE Project Manager
PSR	Pacific Sound Resources
PSRMP	Pacific Sound Resources Management Plan
QA	quality assurance
QA/QC	quality assurance/quality control
QAR	Quality Assurance Representative (for construction)
QC	quality control
RA	remediation area

ABBREVIATIONS AND ACRONYMS (Continued)

RA5 1-4	remediation areas 1 through 4
RA5	remediation area 5
RD	Remedial Design
ROD	Record of Decision
RPM	EPA Remedial Project Manager
SAP	Sampling and Analysis Plan
Section 10/404	Rivers and Harbors Act Section 10; Clean Water Act Section 404
SMARM	Sediment Management Annual Review Meeting
SQS	sediment quality standard(s)
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
VT5	Vessel Traffic Service (U.S. Coast Guard)
WAC	Washington Administrative Code

1.0 INTRODUCTION AND DESCRIPTION OF PROGRAM

Cleanup actions are being undertaken to remediate sediment contamination at the Pacific Sound Resources (PSR) Superfund Site Marine Sediments Unit (MSU) located in Seattle, Washington. The U.S. Environmental Protection Agency (EPA) is the lead agency for the PSR Superfund Site and, hence, management of the site, including the design and construction of the remedy, is the responsibility of EPA. The Record of Decision (ROD) for the MSU (USEPA 1999) identified the remedy as a combination of dredging and capping actions. In February 2003, EPA completed the Remedial Design (RD) for cleanup of the MSU (USEPA 2003a). The U.S. Army Corps of Engineers (USACE), through an interagency agreement with EPA Region 10, is tasked to implement the remedial actions for the MSU.

The MSU encompasses specific areas of Elliott Bay and the shoreline of the former PSR facility. For design and construction purposes, the MSU has been divided into several remediation areas (RAs), as shown in Figure 1. (Note: Figures and tables are inserted after Section 6.0.) There are two general regions of the PSR MSU: RAs 1-4 extend from the shoreline to water depths of -140 feet mean lower low water (MLLW), and RA5 extends from water depths of -140 to -250 feet MLLW. Capping and dredging in RAs 1-4 will be performed by a contractor selected by the USACE, in accordance with design drawings and specifications provided by EPA (USEPA 2003a). For RA5, the USACE is responsible for procuring and providing oversight of permitted placement of dredged material that meets beneficial-use requirements as a cap. The USACE will use suitable material from both its own navigation dredging contractors and/or from private dredging contractors that obtain a permit from the USACE regulatory branch. Capping in RA5 will be constructed in accordance with design drawings provided by EPA (USEPA 2003a).

1.1 PURPOSE OF THIS DOCUMENT

This Construction Quality Assurance Plan for RA5 (CQAP-RA5) describes the construction program for RA5, focusing on the ways in which the USACE and selected contractors will ensure that the construction of the RA5 cap complies with the conditions and requirements of the ROD (USEPA 1999) and the RD (USEPA 2003a).

Figure 2 depicts the three categories of documents involved in the PSR remediation. These are categorized as (1) design and project management documents (collectively termed the PSR Management Plan [PSRMP]), (2) environmental support documents, and (3) construction oversight documents. This CQAP-RA5 is a part of the PSRMP and describes quality assurance procedures during the preparation for, permitting of, and execution of cap placement in RA5. Other documents that comprise the PSRMP are the PSR Cleanup Management Plan (CMP; USEPA 2004b), the PSR Operation, Maintenance, and Monitoring Plan (OMMP; USEPA

2004a), and the RD, which includes the Construction Quality Assurance Plan for RAs 1–4 (USEPA 2003a). These documents are summarized below.

PSR Cleanup Management Plan

- Describes the complete program and clarifies administrative procedures for constructing, monitoring, and maintaining the remedy at the PSR MSU
- Describes the USACE project management approach
- Summarizes documentation and directs the reader to other documents for details
- Documents services provided by USACE environmental support contractors during construction and long-term monitoring

Remedial Design

- Includes the Basis of Design for RAs 1–5, which provides engineering rationale to support the design and meet the objectives set out in the ROD
- Includes Plans and Contract Specifications for RAs 1–4
- Includes Plans for RA5
- Includes Construction Quality Assurance Plan for RAs 1–4

OMMP

- Describes environmental monitoring during construction of RA5
- Describes post-construction long-term monitoring for all RAs

Construction Quality Assurance Plans for RAs 1–4 and RA5

Both documents provide the following:

- Quality assurance (QA) procedures that will be used during construction
- How modifications to construction plans and specifications for work by all contractors will be directed

- A summary of the required inspections, surveys, reporting mechanisms, and documentation
- Significant construction concerns, so that construction personnel may formulate potential responses and corrective actions

The full responsibility for implementing quality control (QC) procedures lies with the contractors. In some instances, the OMMP is referenced for activities relating to construction monitoring for RA5.

1.2 INTENDED AUDIENCE

The intended audience for the CQAP-RA5 is the USACE Construction Quality Assurance Representative and/or the USACE Regulatory Project Manager. This document will also be used by EPA to ensure that the USACE is accomplishing oversight of the PSR MSU in a manner that leads to a well-documented remedy. The quality assurance organization is depicted on Figure 3 and discussed further in Section 3.

1.3 DESCRIPTION OF THE REMEDIAL ACTION AND SCOPE OF CQAP-RA5

RA5 (Figure 1) consists of two areas: RA5a and RA5b. These areas extend from approximately -140 to -240 feet MLLW with slopes of approximately 4 to 15 percent. Cap construction in RA5 will occur by beneficial-use placement of dredged material over a period of 2 or more years. A minimum cap thickness of 24 inches after consolidation, plus 13 inches overplacement allowance to accommodate operational variables during placement, was calculated during the RD (USEPA 2003a). The RD concluded that bottom-dump barge placement may be used to cap in waters of these depths. It is anticipated that the relatively imprecise method of bottom-dump barge placement will necessitate overplacement or "operational allowance" to ensure that each point is covered with the minimum thickness. Accordingly, localized deposits thicker than 40 inches are not unacceptable, but the USACE will seek to refine the RD operational allowance through monitoring and will evaluate whether changes to volumetric placement rates are warranted. This will occur through Engineering During Construction (EDC).

The objectives of construction QA during the placement of dredged material in RA5 are to ensure the following:

- Only materials that have been determined to be suitable for capping are placed on site.

- Coverage and depths of capping meet performance standards developed during the RD.
- Monitoring of the construction of the RA5 cap will be accomplished as described in the OMMP.

Some of the dredged material placed as a cap will be derived from USACE navigation dredging activities using a USACE contractor. Permitted or non-Federal dredging activities may also place dredged material at the site using similar guidelines for placement. Further details on site use are included in the CMP (USEPA 2004b).

Figure 4 provides a process view of the suitability determination, public notice, permitting (for non-USACE projects), and construction. For dredged material placement in open water, a Rivers and Harbors Act Section 10 and Clean Water Act Section 404 (Section 10/404) permit is required. This early part of the process occurs during the normal permitting of dredging and disposal; regionally the process is overseen by the Dredged Material Management Office (DMMO) under the guidelines of the Dredged Material Management Program (DMMP).

Although on-site actions under the Comprehensive Environmental Restoration, Compensation, and Liability Act (CERCLA) do not require permits, but instead rely on substantive requirements of regulations, the off-site dredging projects associated with remediation of RA5 do require permits. Additionally, the determination of suitability of dredged material via the DMMP process is an applicable requirement for placement in RA5. The scope of CQAP-RA5 begins after the Section 10/404 permit (or substantive permit completion), which establishes that dredged material is suitable for PSR, and continues through completion of all of the contracts necessary to complete the cap. USACE contractors placing material will be responsible for meeting requirements of the USACE navigation contract; other contractors placing material must abide by the conditions of the permit and the permit-holder's contract. Work prior to the permit or substantive permit step is discussed further in the CMP, and environmental monitoring in RA5 is discussed in the OMMP (USEPA 2004a).

Capping in RA5 will be accomplished by bottom-dump placement of specified quantities of dredged material at discrete target locations. Target locations and quantities are specified in the RD (see Figure 5, as modified in this document from the RD [USEPA 2003a]). A total of 39 locations ("targets") are designated to receive design quantities of 4,500 to 5,500 cubic yards of dredged material each (bulk volumes). In a given season, the contractor will be informed which of these targets are accessible. To reduce potential for navigation conflicts, the USACE contractor and the permit-holders' contractors may be directed to access different targets. The contractors will place material as described in contract specifications and design. The contractors will have the flexibility to select targets they wish to use from the list of accessible targets. The USACE will verify material placement through electronic data evaluation and

volume of dredged material placed. All placement contractors will provide the information necessary to document material volume and placement location as per specifications.

On Figure 5, the polygons indicate the limits of the verifiable RA5 cap. The curvilinear "bubbles" occur because the contractor will be directed to initiate release within 100 feet from the target locations. "Off target" dumps are discussed later in this document. After each construction season, the areas of RA5 that meet cap thickness requirements will be determined by through-cap cores accomplished by an environmental support contractor. After the desired cap thickness is achieved, the capped area will become part of the long-term monitoring program.

Monitoring in RA5 during and after construction is included in the OMMP and will be used to document the efficacy of the remedial actions for the EPA and State of Washington 5-year review. CERCLA requires that a review for ongoing protectiveness be completed at least every 5 years whenever contamination exceeding acceptable risk levels remains on site. The 5-year reviews for PSR are scheduled to occur in September of 2004 and 2009. The 5-year reviews will consider the available monitoring data at the time of the reviews.

1.4 SITE DESCRIPTION

The following paragraphs briefly summarize conditions at the PSR site. The RD (USEPA 2003a) contains a more complete description of the MSU and an explanation for the basis of the design as related to the site conditions.

The PSR site, formerly known as the Wyckoff West Wood Treating Facility, is located on the south shore of Elliott Bay in Puget Sound, Seattle, Washington. The site is divided into two operable units: the Upland Unit and the MSU. The Upland Unit consists of the former wood-treating facility and occupied an area of approximately 25 acres; the MSU encompasses approximately 200 acres of Elliott Bay and approximately 2,000 feet of shoreline. From 1909 to 1994, wood-treating operations were performed at the site. The wood-treating facility was originally a pile-supported facility over the Duwamish River estuary. The shoreline and intertidal area were filled in at various times throughout the last 100 years, and the facility was eventually entirely located on approximately 25 acres of fill material. This in-filling resulted in additional land and a steep riprap bank on the shoreline between the upland and offshore area.

Groundwater and soils contamination by creosote and other wood-treating waste products was present in the Upland Unit. Cleanup actions in the Upland Unit have been completed and include demolition of all on-site structures, source material removal (highly contaminated soil and sludge), nonaqueous-phase liquid collection and disposal, and isolation of remaining contaminated soil and groundwater with a low-permeability surface cap and subsurface slurry

wall. The slurry wall is 1,600 feet in length and its depth varies from 32 to 51 feet below ground surface.

The sediments in the MSU were contaminated by discharge of used and waste creosote and wood-treating chemicals from the former wood-treating operations on the upland portion of the site. Chief chemicals of concern in the MSU according to the Remedial Investigation Report (USEPA 1998) included polycyclic aromatic hydrocarbons (PAHs), phenolic compounds, dibenzofuran, polychlorinated dibenzodioxins and dibenzofurans (PCDDs and PCDFs), polychlorinated biphenyls (PCBs), and mercury. PAHs have been detected in excess of ecological screening levels to depths of 20 feet below the preconstruction mud line at the site.

1.5 SUITABILITY OF DREDGED MATERIAL FOR PSR RA5

The CMP describes the selection and determination of suitability of material for use as a sediment cap at the PSR Superfund site. The PSR ROD (USEPA 1999) references the Washington Sediment Management Standards (Washington Administrative Code [WAC] 173-204-320 and 340), which establishes concentration-based and biological-effects-based cleanup screening levels (CSLs) and sediment quality standards (SQS).

In accordance with the ROD, all dredged material placed at the PSR site must meet SQS criteria (CSLs, SQS, and other relevant chemical standards for dredged material are included in the CMP [USEPA 2004b] and OMMP [USEPA 2004a]). In addition, the RD (USEPA 2003a) establishes two additional constraints on the physical characteristics of dredged material to be placed in RA5:

- To avoid excessive turbidity during placement and excessive off-site transport of dredged material, the maximum dredged material fines content for RA5 is 30 percent.
- To avoid excessive mound thicknesses (which could trigger bearing capacity failures) and to control the variability of the thickness of the completed cap, the cohesiveness of the dredged material is limited to a plasticity index less than 10 as measured using American Society for Testing and Materials (ASTM) D 4318.

Use of material with greater percentages of fines or greater cohesiveness may be considered if such material becomes available. However, such deviations will have to be agreed to by EPA and may be accompanied by additional monitoring during and after placement.

Suitability determinations for beneficial use of dredged material at the PSR MSU will be accomplished by the DMMP using the PSR Users' Manual (Appendix C of the CMP). The

DMMP consists of staff from the USACE (Seattle District), EPA, and the Washington State Departments of Ecology (Ecology) and Natural Resources (DNR). The suitability determination will identify dredged material management units (DMMUs) suitable for placement at PSR. The USACE Seattle District DMMO will provide the information necessary to determine material suitability prior to issuance of the Public Notice and permit for projects (Figure 4).

1.6 CONTRACTORS

There are two mechanisms for acquiring dredge material for placement at the PSR MSU:

- USACE navigation maintenance dredging contracts
- Permit-holders' contracts for other dredging projects

For construction QA/QC, there will be different USACE oversight personnel for each type of contract. Figure 4 notes key requirements of RA5 construction contractors. Figure 6 provides additional information regarding data collection systems used to ensure that placement meets requirements for designed locations.

2.0 ORGANIZATION OF THE CQAP

This CQAP-RA5 describes how the USACE will implement the RA5 remediation construction project in a manner that complies with the conditions and requirements of the ROD, the remedial design documents approved by the EPA, and the contract plans and specifications. It delineates the QA methods and protocols for project personnel to ensure a complete understanding of monitoring, feedback, and adjustment mechanisms.¹

The rest of this document is organized as follows:

- Section 3, Project Roles and Responsibilities, presents the roles and responsibilities of the parties involved in the remediation action.
- Section 4, Overview of Inspection, Sampling, Monitoring, and Documentation Activities, summarizes the inspections, tests, sampling, and monitoring activities to verify compliance with the contract documents and describes the submittal requirements before and during construction activities
- Section 5, Construction Concerns, Quality Control Measures, and Corrective Actions, provides the following:
 - Potential problems, concerns, and remedies
 - Monitoring, contingency plans, and corrective actions
 - Description of equipment, monitoring, and maintenance
- Section 6 provides references.

¹ Note: The appropriate elements of the PSRMP, when supplemented with the contractor's required plans, will be equivalent to the EPA-required Remedial Action Management Plan.

3.0 PROJECT ROLES AND RESPONSIBILITIES

Table 1 shows the USACE organization by branch for each remedial activity. (Contractors have their own Construction Quality Control Programs, which are not shown.) Table 2 describes the organization of the Construction Quality Assurance Team by name and responsibility.²

3.1 EPA REMEDIAL PROGRAM MANAGER (RPM)

EPA is the regulatory authority and responsible agency for the remedial action. In this capacity, EPA will review and approve contractor submittals to ensure that the contractor's QC program is consistent with the remedial design objectives. EPA will make final decisions to resolve unforeseen problems that may change the project components or the manner in which the construction is undertaken. Working with the EPA and USACE staff, the RPM defines the construction objectives; approves monitoring methods, schedule, and QA reports; and determines management actions. The EPA Region 10 RPM is Sally Thomas.

3.2 USACE PROJECT MANAGER (PM)

The PM is responsible for ensuring the quality of work of the USACE team to EPA, for preparing and tracking budgets and schedules, and for coordinating tasks. The PM is Miriam Gilmer.

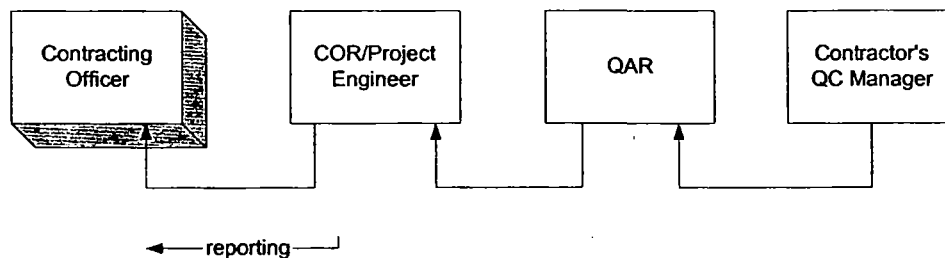
3.3 CONTRACTING AND CONSTRUCTION ASSURANCE TEAM

3.3.1 USACE Navigation Maintenance Contracts

Construction projects for USACE navigation maintenance will be managed by the USACE and executed by dredging and placement contractors. (For contracts managed by non-USACE permit holders, see Section 3.9). The Contracting Officer (CO) has responsibility for USACE construction management and contract administration; the CO will designate a Contracting Officer's Representative (COR, who is often also the Project Engineer) and a construction Quality Assurance Representative (QAR) to accomplish tasks to this end. (See diagram following this paragraph.) The QAR for this project is Brenda Bachman. The CO or COR will deal with USACE contractors on contractual matters and will ensure compliance with contract requirements. The CO/COR uses a construction QAR to monitor the contractor, but the interface for all

² Individuals responsible for suitability determination (not involved in construction oversight) are described in the CMP (USACE 2004b).

contractual matters is directly between the CO/COR and the contractor. The COR or Project Engineer is responsible for overseeing the implementation of CQAP-RA5, including material suitability verification, testing, construction, and reporting in accordance with the contract plans and specifications. These activities may be assigned to subordinate inspectors or may be conducted by consultants with the requisite expertise and experience. The CO for the navigation contracts is Sharon Gonzalez. The COR/Project Engineer for navigation projects is Robert Parry. The QAR (to be determined) will be responsible for supervising the USACE contractors that will place the material on a day-to-day basis. See Table 2 for further information on names and roles.



3.3.2 Environmental Support for Monitoring and Shoreline Revegetation Contract

For all activities by this contractor (including water quality, sediment coring, sampling and analysis, and beach revegetation), the CO/COR will ensure that the contractor complies with contract requirements and provides all necessary QA information. The CO for the environmental support contract is Ron Bush. The COR is John Wakeman.

3.4 USACE ENGINEERING DURING CONSTRUCTION (EDC) TEAM

This group provides technical and contracting support, reviews monitoring plans and reports, and evaluates monitoring results and potential modifications to the construction program. Table 2 lists EDC personnel and roles. The EDC Team will document and evaluate construction actions at RA5. One member of the EDC Team will be assigned to coordinate receipt of electronic barge positioning data and dredge material volumes that have been placed at each target. The EDC Team's reports will be provided to the responsible parties at the USACE for both the USACE construction contract and for permit-holders' activities (the COR and the Regulatory Project Manager, respectively).

Positioning and volumetric data will be preprocessed by an environmental support contractor and the EDC coordinator responsible for loading the data into a data management system, such as the Dredged Material Spatial Management Analysis Record Tool (DMSMART), where it will be evaluated weekly by the EDC Team during active placement periods. The team will prepare

weekly summary reports and these reports, which will be transmitted to the Regulatory Project Manager (for non-USACE contractors) or the QAR and CO (for USACE contractors). Reports will describe (1) contract compliance and coverage statistics for the ongoing cap activities, (2) recommendations for modifications to cap construction (for example, when a target location has received sufficient dredged material), and (3) recommendations for corrective actions. Figure 6 illustrates the data management process for positioning and volumetric data.

3.5 USACE NAVIGATION PROJECT MANAGERS

The Navigation Project Managers are located in USACE Operations Division, Technical Services, Navigation Section. They are responsible for identifying dredged sediments that may be used at the PSR site, for directing sampling and evaluation of these sediments, and for preparing the contract plans and specifications for the activity. As noted in Table 2, Patricia Miller and Hiram Arden are the Navigation Project Managers.

3.6 USACE REGULATORY BRANCH PROJECT MANAGERS

Direction of the permitted non-USACE dredging and cap placement contractor will be the responsibility of the permit holder. The Regulatory Branch Project Managers providing oversight of these projects and communicating with the permit holder are located in USACE Operations Division, Regulatory Branch, Enforcement Section. Selection of a Project Manager will depend upon the permitted project contributing dredged material for beneficial use at the PSR site. See Table 2 for names and roles. See Figure 6 for the data acquisition strategy for dredge material placement/location. As noted, the EDC Team will provide positioning data relative to disposal placement for the Regulatory Project Managers. The lead Project Manager is Kristina (Tina) Tong.

3.7 DREDGING CONTRACTORS

Dredging contractors will place clean dredged materials from navigation maintenance of waterways (USACE) or permitted maintenance and development projects (permit holders) over contaminated sediments in RA5 in accordance with the contract specifications and the permit (for non-USACE contractor) or substantive permit (USACE contractor).

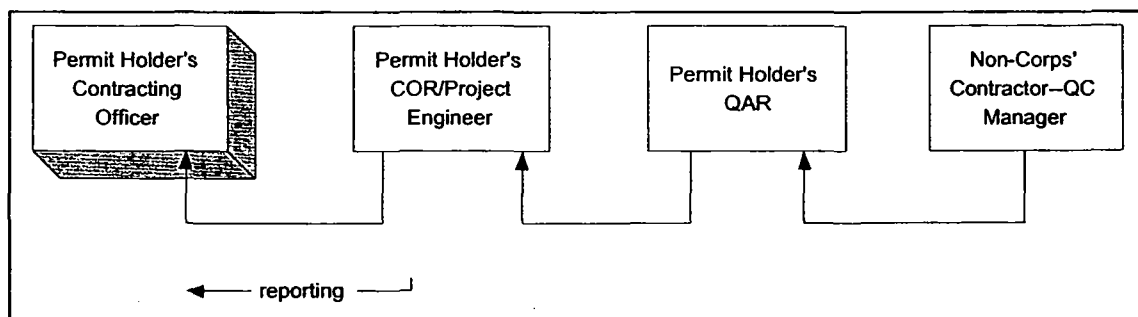
3.8 CONTRACTORS' CONSTRUCTION QUALITY CONTROL (CQC) MANAGERS

For all construction activities, the contractor will furnish a Contractor Quality Control Plan (as a part of the required Work Plan) for review and approval after notice to proceed and prior to start

of work. This plan will document the Construction Quality Control (CQC) organization and identify a CQC Manager. The CQC Manager will be responsible for ensuring that all work complies with contract requirements and the conditions of the permit (or substantive permit), and documenting this as required.

3.9 PERMIT HOLDERS

The permit holders, who are ultimately responsible for dredging and placement of material by their contractor and any subcontractors, will provide QA oversight of the contractor. The organization is similar to the USACE, although the individuals are not USACE employees or contractors. The contractor's QC Manager also is responsible for providing documents and data to the USACE representatives.



3.10 ENVIRONMENTAL SUPPORT CONTRACTORS

One or several environmental support contractors may be engaged by the USACE to fulfill various functions:

- Water quality monitoring during construction (if required by the Water Quality Certification)
- Monitoring for cap extent, thickness, and the total organic carbon (TOC) content in RA5 at the end of each construction season³
- Documenting site conditions in a final report upon RA5 cap completion in order to provide data for the EDC Team to determine compliance with the ROD and RD

³ TOC is likely to be monitored only during the first season. See the OMMP.

- Processing and providing QA on electronic positioning and barge opening data, acquired from telemetry from the barges during construction
- Planting and maintaining vegetation in RA1 until it is well established. For further information, see Section 4.7.

The monitoring contractor will be responsible for producing a USACE- and EPA-approved Sampling and Analysis Plan (SAP) for the above activities prior to start of dredged material placement in RA5. The OMMP contains data quality objectives to direct the SAP.

4.0 OVERVIEW OF INSPECTION, SAMPLING, MONITORING, AND DOCUMENTATION ACTIVITIES

The organization of this section follows the process flow diagram in Figure 4.

4.1 PREPARATION OF WORK PLAN DOCUMENTS BY ALL DREDGING/ PLACEMENT CONTRACTORS

The following requirements for a Remedial Action Management Plan or Dredging QC Plan (both terms are used) will be incorporated in permit or substantive permit conditions and USACE construction plans and specifications. They describe the minimum document submittal necessary for using the PSR site for placement of dredged material. Non-USACE contract documentation will likely vary from this in minor ways; however, the substantive portions of these documents are required in a Dredging QC Plan.

- **Work Plan.** The Work Plan describes the nature of the work to be done, positioning and documentary procedures, and the equipment to be used in accomplishing the work. The Work Plan defines in particular how the contractor will discriminate between different DMMUs during dredging to ensure that only suitable DMMUs are transported to both the PSR and (if it should need to be used) the DMMP open-water disposal site. It describes how Differential Global Positioning System (DGPS) equipment will meet the contract performance standards for disposal. A ± 10 -meter (33-foot) horizontal positioning requirement will be required in the permit or in the plans and specifications. This requirement is in accordance with the following advice from the U.S. Coast Guard (USGC):

The published accuracy for a DGPS site is 10 meters navigational accuracy within the established coverage area. In the introduction section of the U.S. Coast Guard Light List is a list of all of the DGPS sites and their range, generally from 40 to 300 nautical miles. Locally there are two sites: Robinson Point, range 180 miles, and Whidbey Island, range 90 miles. The range is dependent on the size and height of the transmitter. This information can also be found in National Imagery and Mapping Agency Pub. 117, Radio Navigation Aids. (Personal communication, 2/10/03: QM2 William Snell, USCG Group Seattle Operations, 206-217-6001, wsnell@pacnorwest.uscg.mil)

The Work Plan also describes methods for ensuring accurate reporting of volumes (or weights) of dredged material in the barges.

- **Sampling and Analysis Plan.** A SAP is prepared if required by Ecology for water quality monitoring at the dredging site.⁴ This plan, if necessary, specifies field tests and any laboratory tests and their interpretation and includes a schedule of monitoring events and dates. Note that water quality at the PSR site during placement will be monitored by a separate USACE-contracted environmental contractor, who will produce a separate SAP for water quality monitoring.
- **Accident Prevention Plan and Activity Hazard Analysis** (reference: USACE 1996). This plan describes activities, the hazards associated therewith, and measures to prevent harmful accidents to the work force and the community near the contractors' activities. Although contractors will be placing dredged material over a Superfund site, they will not contact PSR site chemicals because they will perform no intrusive work and water depths are approximately 140 feet or greater. The contractors are expected to conclude that chemical hazards arising from the site are not significant. Other chemicals that contractor personnel could contact include petroleum, oil and lubricants, and fumes from diesel engines. On-water work where man overboard, temperature extremes, and heavy and energized equipment is also expected at the PSR site. (This brief statement constitutes a Safety Design Analysis for this project; such an analysis is a USACE requirement for a hazardous waste design.)
- **Contractor Quality Control (CQC) Plan and Statement of Qualifications** (reference: USACE Specification 01451, Contractor Quality Control). This covers the organizational roles and responsibility of each contractor to ensure that project quality is maintained. It also contains schedules for the work and required certifications and licenses required by the plans and specifications or for operating equipment.

⁴ According to USACE personnel, this is not always required; the State 401 Water Quality Certification for Dredging will determine this requirement.

- **Environmental Protection Plan** (reference: USACE Specification 01355, Environmental Protection). This plan describes procedures and methods for meeting applicable environmental laws and regulations and for preventing environmental damage during the course of dredging and cap placement.⁵
- **Spill Prevention and Emergency Response Plan** (reference: USACE Specification 01355, Environmental Protection). This plan addresses spill prevention and corrective measures for cleanup of any spills that occur during performance of this contract for substances brought on site or transported to the site by the contractor. (Note: The term "spill" does not include possible releases arising from the placement of clean dredged material on contaminated sediments at the bottom of the harbor. In the unlikely event of such releases from bottom sediments, the EDC Team in consultation with EPA will determine the appropriate responses. See Section 5.7 for further discussion.) These contingency measures will address the measures (1) to prevent spills during dredge material handling, packing, transportation, storage, or other operations performed during this contract and to control and contain spills using properly protected and trained personnel and (2) to remove or remediate all wastes or substances that become contaminated due to spillage. If a spill is due to the actions of the contractor or any subcontractor, the contractor is responsible for taking all necessary actions at his own expense to correct any and all damage caused by the spill.

4.2 REVIEW AND APPROVAL OF PLANS AND PRE-DREDGE CONFERENCE

The USACE, EPA, and the State of Washington Departments of Ecology and Natural Resources will review and approve the plans required in Section 4.1. The approval occurs at the Pre-Dredge Conference (or shortly before or after). At that conference, the contractor will discuss the procedures and practices for ensuring that the contract and permit conditions are met. The approved documents are verifiable elements for this CQAP. Also, a verifiable element is the discussion/demonstration by the contractor on how he will meet the 10-meter (33-foot) horizontal positioning requirement for placement.

⁵ The ROD is sufficient to determine environmental compliance for disposal in the context of the national and State of Washington environmental policy acts. EPA has prepared a Biological Assessment that addresses the Endangered Species Act and Magnuson Act compliance (USEPA 2003b). The dredging activity, because it is not a CERCLA on-site activity, is not covered by these determinations and documents; thus, it is the responsibility of the USACE or the permit holder to obtain documentation that these aspects of compliance are met with the dredging activity.

4.3 DREDGING

Oversight of dredging and dredge material placement by the QAR or Regulatory Branch Project Manager may occur both in the field and by reviewing documents and electronic records, as indicated in Figure 6. Verifiable elements include the following:

- Notification to USACE Regulatory Branch Enforcement Section at least 14 days prior to commencement of dredging.
- Notification to U.S. Coast Guard Vessel Traffic Service (VTS) at least 14 days prior to dredging to ensure that a Notice To Mariners is made, in accordance with requirements in USCG COMOT INST M 16672.2A, International-Inland, dated December 23, 1983. This is a standard requirement for permits and USACE projects. The intent is to identify and reduce conflicts to navigation.
- Statement by contractor that only DMMUs suitable for PSR have been placed in barges bound for the site.

4.4 QA/QC REPORTING

- Each contractor will be required to submit Daily Construction Quality Control Reports (DCQCRs) to the USACE QAR for USACE contracts and to the USACE EDC coordinator. DCQCRs include reports of dredging and placement activities. As noted in Figure 4, reporting for dredging is due to the State of Washington and the USACE QAR by Wednesday of the week following the construction activity. This requirement will be included in the USACE plans and specifications.
- The EDC Team will submit Quality Assurance Reports weekly to the COR and the USACE Regulatory Project Manager. This weekly report will include a description of (1) material origin (by DMMU), (2) bulk quantities placed at each location, and (3) any off-target placements. The report will describe the results of the QA inspections, testing, surveying, and monitoring activities and the effectiveness of the contractor's QC activities. Any work found not to be in accordance with the EPA-approved remedial design plans, specifications, work plan, and/or documents will be written up as a deviation report by the dredging contractor and submitted to the COR, Regulatory Project Manager, and EPA. In accordance with CMP Appendix B ("Document and Data Management Plan"), the QA reports (including backup documentation) will be sent to the designated file manager in the Records Information Management System, Engineering/Construction Division, of USACE.

- Electronic data on barge positioning will be acquired by one of several commercially available data loggers that are capable logging position via a DGPS and indicating a barge-opening event.
- As shown in Figure 6, data will be uploaded to a USACE contractor for QA, then entered into a centralized database (DMSMART), with visual imaging of the data available through ARC-GIS™. Paper copies of barge release location will also be included in DCQCRs. The contractor will also be required to supply electronic data to the EDC Team on the weight of dredge material that has been deposited. (A spreadsheet format will be provided to capture the data.)
- The EDC Team will superintend data entry into the database and provide the QAR and Regulatory Project Manager with information on barge placement performance, amounts of deposited material, and recommendations for future disposal locations and amounts. In addition, if required, the EDC Team will provide summaries of water quality monitoring at the PSR site from the environmental support contractor performing the monitoring. Summary reports of the deposition and water quality data will be prepared weekly.
- In the event that a change if necessary or changed condition is encountered, as defined in the USACE contract documents, the USACE QAR will review the condition and determine what revision in the construction activity or construction product is required. Any significant changes to CO-approved documents require EPA approval before being implemented, unless health and safety are of concern. This review and determination will be made in recognition of the project design documents, and EPA will be involved in the review and revision if the change is significant in its impact.
- The USACE Regulatory Project Manager relies upon Ecology to make inspections of the dredging activity. Irregularities with the permit requirements will be notified to the permit holder and the USACE Regulatory Project Manager, who will notify EPA.

4.5 PLACEMENT DATA COLLECTION

QA oversight of the material placement will be by the USACE QAR or the permit-holder's QAR. As described in Section 4.4, the DGPS, barge release, and dredge placement weight information will be transmitted to a USACE environmental support contractor. The interpreted data will be available to the EDC Team within 3 or 4 days after the placement event and will be used by the EDC Team to determine future placement locations and volumes. This EDC

information will then be transmitted back to the QAR and/or the Regulatory Project Manager for direction of the USACE or non-USACE contractors. Verifiable elements include the following:

- Inspection of positioning logs, DCQCRs, and/or electronic data to ensure that the correct DMMUs are sent for placement at PSR
- Placement at the designated target location(s) within a 100-foot radius of the point (further information given in Section 5.7)
- Successful electronic data upload
- Interpreted positioning data confirming placement on-target
- Running estimates of the volumes of dredge material placed at each location to estimate placed volumes per location. The running volumes will be used with the dredge volumes designated in the RD (USEPA 2003a) shown in Figure 5 to estimate when sufficient material has been deposited to meet the design cap thickness. The specifications prepared by the USACE for the USACE contractor or the permit-holder's contractors prior to dredge placement will describe the methods by which the weight of dredge material will be converted to dredge volume.
- DCQCRs showing adherence to contract
- Data from the environmental monitoring contractor confirming the requirements in the Water Quality Certification for placement (if there is one)

4.6 INSTRUCTIONS TO THE CONTRACTOR TO REFINE PLACEMENT

For all contractors, the specified QAR may direct the contractor to place barge loads at alternate targets; however, it is the responsibility of the contractor to follow the plans and specifications for target volume, location, and reporting. As noted in Section 4.4, the EDC Team will confirm capping progress based on automated data evaluation and will provide information to the QAR and Regulatory Project Manager. The verifiable element is a determination that the contractor has followed the advice from the COR.

4.7 ENVIRONMENTAL SUPPORT CONTRACTS—MONITORING AND REVEGETATION

The verifiable elements of the water quality monitoring task are regular (usually weekly) reports showing suitable adherence to calibration procedures specified in the Scope of Work. The verifiable elements of the coring program are annual reports indicating the depth and extent of completed cap in RA5.

The environmental support contractor will also plant shrub and herbaceous materials by “sprigging” on the beaches following construction and grading by the RAs 1–4 construction contractor and then water for one season to ensure that the vegetation is established. The plants include seashore saltgrass (*Distichlis spicata*), gumweed (*Grindelia integrifolia*), and American dunegrass (*Leymus mollis*). Conditions for planting will be specified in the Scope of Work for the environmental contractor and are shown in the RD (USEPA 2003a, Specification Sections 02923 and 02930 and Plates C-31 and C-33). Quality assurance for this aspect of the project is the responsibility of the EDC Team. The verifiable elements are freshly potted materials, compliance with the timing and distribution of plantings, and adherence to the required maintenance schedule. The survivability of the plants is not a verifiable element, although survivability is expected to be substantial.

4.8 PROJECT CLOSEOUT REPORT

Although Project Closeout and Remedial Action Reports are developed after construction activities are complete, they are the end result of the activities, and the Remedial Action Report (next paragraph) is the documentation to EPA that the cap has been constructed according to good engineering practice. Construction contractors will prepare Closeout Reports on their activities. For Federal navigation projects, the USACE hydrosurvey crew will perform pre- and post-dredging surveys and volume take-offs to document volumes to ensure the contractor’s payment. These data are key for assessing material quantities delivered to RA5. For permit-holder contractors, the contractor typically performs the hydrosurveys and volume calculations. A summary report is typically prepared by the QAR under either kind of contract and submitted to the State of Washington. In this case, it will also be submitted to the USACE and EPA. Upon review of the USACE contractor’s report by the QAR and approval by the CO, this contract will be considered fulfilled. The Regulatory Branch Project Manager will also inspect the permit-holder’s contract final report. Verifiable elements include the approved final Closeout Report and data interpretation by the EDC Team.

4.9 REMEDIAL ACTION REPORT

After completion and confirmation of the RA5 cap, the USACE EDC Team will prepare a Remedial Action Report for EPA. The report, which includes the following sections, verifies that the construction phase of the remedy has been completed.

- Introduction
- Chronology of Events During Remediation
- Performance Standards and Construction Quality Control
- Construction Activities
- Certification That the Remedy Has Been Constructed

5.0 CONSTRUCTION CONCERNS, QUALITY CONTROL MEASURES, AND CORRECTIVE ACTIONS

5.1 VIOLATION OF CONTRACT, PERMIT, OR DREDGE/PLACEMENT PLAN CONDITIONS

- **Potential Problems, Concerns, and Remedies.** These are the responsibility of the contractor to address. They may be administratively significant and should be addressed rapidly once a problem is recognized.
- **Monitoring, Contingency Plans, and Corrective Actions.** Data review and inspection⁶ as noted in Section 4.4 should indicate nonconformances with the plans and specifications. A corrective action will be initiated by the USACE CO as soon as practicable with the contractor or, in the case of the permit holder, between the Regulatory Project Manager and the permit holder.

5.2 PLACEMENT OF DREDGED MATERIAL OUTSIDE OF TARGET LOCATIONS

In the RD (USEPA 2003a), the USACE STFATE model was used to design the dredged material placement in RA5. A multiple-dump scenario was evaluated in the RD to determine placement requirements in RA5, and target locations were designed on a 200-foot grid. A performance objective of centering the barge within a 100-foot distance of the target was established in the RD, based on achieving a reasonably uniform cap thickness. This approach minimizes the volume of dredged material required in RA5 and also reduces the uncertainty in the overall required volume.

- **Potential Problems, Concerns, and Remedies.** With respect to material placement, contracts will be written with a performance standard of placement of the material within a 100-foot radius of designated target locations based on the location of the center of the barge. The PSR RA5 site boundary is represented on Figure 5 by straight-edged polygons; however, the area that may receive dredged material from barges is seen to have a complex edge owing to the radial tolerance from fixed stations (targets) indicated in the RD. In practice, contractors will be given a list of targets that they may use until each target has received sufficient quantities of material to complete the cap. Two kinds of problems (described

⁶ The USACE Enforcement Section relies on the Washington Department of Ecology for inspections at the dredging site for non-USACE permitted actions.

below) can arise from placement that does not meet the specifications and/or permit. In addition, each type of problem has two kinds of consequences: first, for the remediation, and second, for contract compliance. The following cases describe consequences for the remediation.

Case 1. Placement occurs at a location more than 100 feet from the designated target and within the boundary of RA5. In this case, the actual dump location will generally be within 100 feet of some other target, and so 100 percent of the material volume will be credited to the nearest target.

Case 2. Placement occurs at a location more than 100 feet from the designated target and outside RA5's complex boundaries. The area immediately outside the PSR site is somewhat contaminated (between SQS and CSLs); consequently, there may be some benefit from the placement. However, all or a portion of the material is likely to be ineffective in capping the site, and therefore a correction factor will be applied to allocate a percentage of the material to the nearest target, as described below.

- **Monitoring, Contingency Plans, and Corrective Actions**
 - **Accounting for Off-Target Placement.** Table 5 (with a figure attached) displays data from modeling accomplished during the RD using the USACE STFATE model, with a single placement of a typical 1,000-cubic-yard barge of dredged material in a representative location at RA5. (Refer to Appendix D of the RD [USEPA 2003a], STFATE Run #5.) The resulting mound thickness diminishes rapidly away from the target. Therefore, the correction factors shown in Table 5 will be used. In this manner, it will be possible to keep track of the loading of each target zone if the contractors have trouble staying on target.

In practice, off-target dumping in Case 1 (inside the cap boundary) will generally be within 100 feet of some other target, and so 100 percent of the material volume will be credited to the nearest target. In Case 2, the correction factors shown in Table 5 will apply. Should a contractor deposit his barge contents 100 to 150 feet from the target, the target will be considered to have received 33 percent of the barge volume of dredged material. Should a contractor deposit the load more than 150 feet from the target, 0 percent of the material will be considered to have accumulated over the target zone. For dumps greater than 150 feet outside the cap boundary, there may be benefit to the surrounding area but none to the cap.

- **Effect on Contract Compliance.** Placement locations will be monitored by inspection of DCQCRs and electronic positioning and barge release data. If the permit-holder contractor repeatedly places material outside the target locations, corrective actions may be required. The CO/COR (for USACE contractors) or the Regulatory Project Manager (for non-USACE contracts) will make a determination of the seriousness of the contract compliance issue. Corrective actions will be at the discretion of the CO or Regulatory Project Manager and may include adjusting procedures, educating crews on tug and barge, modifying accessible disposal sites, imposing fines, or denying use of the PSR site to the contractor.

5.3 AVOIDANCE OF POTENTIAL TRAFFIC CONFLICTS BY BARGES OR TUGS

- **Potential Problems, Concerns, and Remedies.** Traffic interference may occur during movement of barges to and from Puget Sound. Although unlikely, the PSR target locations could conceivably be used by more than one placement contractor at a time.
- **Monitoring, Contingency Plans, and Corrective Actions.** Navigation conflicts will be reduced by communication with the U.S. Coast Guard Vessel Traffic Service as noted in Section 4.3. Notifying the VTS and monitoring marine bands for conflicts will avert conflicts. In addition, the permit holders will be given a different set of targets from the USACE navigation contractor to reduce potential conflicts. Corrective actions include a safety briefing by the contract manager (i.e., the CO or his representative, or the permit-holder's Project Engineer or his representative).
- **Description of Equipment, Monitoring, and Maintenance.** Requirements for contacting the U.S. Coast Guard's VTS in advance are in the contract and permit conditions, and a Notice To Mariners. The tug captain must keep paper and electronic records of the DGPS positioning and the amount of dredge material deposited. In addition, the tugboats will be required to have equipment that will allow automatic electronic upload of the positioning data.

5.4 POSITIONING AND RECORDKEEPING TO ENSURE THAT ONLY SUITABLE DMMU DREDGED MATERIALS ARE SENT TO PSR

- **Potential Problems, Concerns, and Remedies.** Only suitable dredged material from designated DMMUs may be placed at the PSR site. PSR and the Elliott Bay

DMMP site are not freely interchangeable because the requirements for capping material at PSR are stricter than those for an open-water DMMP site. Since it is possible that adjacent DMMUs may vary in acceptability, it is important that the DMMUs be tracked during the dredging and documented, and that the contractor clearly understands the suitability categories.

- **Monitoring, Contingency Plans, and Corrective Actions.** Weekly review and report preparation of DCQCRs will be performed by the construction EDC Team. In the event that a barge load suitable for the DMMP site, but not PSR, is placed at PSR, the EDC Team will inform the CO, who will contact the USACE PM and the EPA RPM to determine whether additional loads of PSR-suitable material will be placed over the spot where the release occurred.
- **Description of Equipment, Monitoring, and Maintenance.** The key equipment is the DGPS and offsets used at the dredging site to indicate a DMMU location. The DGPS will be demonstrated to meet required performance of the plans and specifications or the permit.

5.5 TOTAL ORGANIC CARBON IN CAP

- **Potential Problems, Concerns, and Remedies.** The RD assumed a 1 percent TOC in the cap to ensure that permeation by organic solutes will not occur. Review of dredged material records from former seasons suggests that this should not be difficult to attain at the dredge site. However, the RD also notes that more than 50 percent of the placed material will likely settle outside of the PSR site due to drift of finer materials during the descent phase to the bottom. This will introduce an unknown loss of TOC that may be significant because TOC is likely associated with fines that settle farther away from the dump site than sands. The chemical isolation modeling in the RD was conservative, and so attaining 1 percent TOC in the RA5 cap is not considered a "bright line" performance requirement.
- **Monitoring, Contingency Plans, and Corrective Actions.** At the end of the first capping season, a monitoring event (described in the OMMP) will test the TOC at four locations on the surface of the area that has been capped. Should the average TOC be greater than 0.5 percent, this feature of the monitoring program may be eliminated in future years. However, should the average value be below 0.5 percent, the EDC Team will be consulted. Potential corrective actions, if deemed necessary, include the following:

- Continuing monitoring for TOC as a program feature
- Attempting to target higher TOC sediments for future placement
- Placing additional volumes to attain a greater cap thickness

5.6 STAKEHOLDER CONSTRAINTS

- **Potential Problems, Concerns, and Remedies.** For the work at the PSR site, placement may continue 24 hours/day with the significant exception of periods conflicting with Tribal fishing. For USACE contractors, the CO/COR/Project Engineer will coordinate with affected Tribes, determine the potential conflicts, and instruct the contractor. Permit holders accomplishing placement will conduct all coordination as stated in the permit.
- **Monitoring, Contingency Plans, and Corrective Actions.** DCQCRs will indicate any placement of material that is not allowed. See also Section 5.1.

5.7 PETROLEUM SPILLS OR RELEASES FROM BOTTOM

- **Potential Problems, Concerns, and Remedies.** If a contractor-caused spill occurs, then the contractor must respond as described in his Spill Prevention and Emergency Response Plan. Another potential concern is release from the bottom of free product appearing as an oil slick for a sustained period of time so as to trigger environmental concerns. In the event of a slick, it is possible that a submarine landslide has occurred from placement of the dredged material on an unstable surface. The USACE will not hold the contractor liable for this situation so long as contract requirements are being met and it can be verified that the slick is not a release from the contractor's vessel, such as a fuel spill.
- **Monitoring, Contingency Plans, and Corrective Actions.** For slicks encountered during placement and attributable to the contractor's actions on his vessel, oil-sorbent materials or booms may be used for response. In the case of a bottom release, the remedy will depend upon the intensity and persistence of the sheen or slick. In most cases, the remedy will be to document the slick and observe its dissipation, but an emergency response may also be required. The contractor will be required to report to the COR any slicks that he observes. The plans and specifications and permit will state that a significant slick means a greater-than-100-square-foot slick that persists for more than 30 minutes. (This size and persistence references the CQAP for the Wyckoff/Eagle Harbor Superfund Site Offshore Cap.) Experience suggests that releases from the bottom

are transitory. The contractor is not required to stay on site for 30 minutes but is expected to immediately notify the USACE, who will mobilize to monitor the situation. Based on the monitoring, the USACE and EPA will determine whether it is necessary to notify the National Response Center. The USACE will arrange for emergency responders to be on standby during cap construction.

5.8 WATER QUALITY EXCEEDANCES

- **Potential Problems, Concerns, and Remedies.** Turbidity increases or dissolved oxygen deficits may exceed water quality criteria during bottom-dump barge placement at the PSR site outside of the water quality variance zone (typically 300 feet from the barge) permitted in the Water Quality Certification. Should exceedances occur, remedy options include halting placement at the PSR site or modifying the placement, including shifting it elsewhere on the site.
- **Monitoring, Contingency Plans, and Corrective Actions.** A USACE contractor will undertake water quality monitoring at the PSR site. Samples will be taken at the edge of the designated water quality variance area. Frequencies and duration of sampling will be determined in the EPA/State Water Quality Certification. However, it is anticipated that the USACE environmental support contractor will initially monitor weekly during the placement activity at the PSR site. After 2 weeks, the monitoring activity will be assessed for continuation. At other DMMP sites in water of these depths, turbidity exceedances have not occurred, and monitoring has been eliminated. Should an exceedance occur, oversight personnel and the EDC Team, which oversees the environmental support contractor, will recommend to EPA and the CO whether to discontinue cap placement activities and divert the material to a DMMP site or to modify placement until water quality returns to acceptable levels.

6.0 REFERENCES

- U.S. Army Corps of Engineers (USACE). 1996. Engineering Manual 385-1-1: *U.S. Army Corps of Engineers' Safety and Health Requirements Manual*.
- . 2001. Engineer Manual 1110-2-1003: *Hydrographic Surveying*.
<<http://www.nap.usace.army.mil/channel/.em/>>
- U.S. Environmental Protection Agency (USEPA). 1998. *Remedial Investigation Report, Pacific Sound Resources, Marine Sediments Unit, Seattle, Washington*. Prepared by Roy F. Weston, Inc., for EPA Region 10, Seattle, Washington. January 1988.
- . 1999. *Pacific Sound Resources (PSR) Superfund Site, Seattle, Washington, Record of Decision*.
- . 2003a. *Final Design Submittal, Pacific Sound Resources Superfund Site, Marine Sediments Unit, Seattle, Washington*. Prepared by URS Group, Inc., under Contract No. 68-W-98-228 for EPA Region 10. Seattle, Washington. February 2003.
- . 2003b. *Biological Assessment for the Pacific Sound Resources Marine Sediments Unit*. Prepared for EPA Region 10 by the U.S. Army Corps of Engineers. Seattle, Washington.
- . 2004a. *Final Operation, Maintenance, and Monitoring Plan, Pacific Sound Resources Superfund Site, Marine Sediments Unit, Seattle, Washington*. Prepared by U.S. Army Corps of Engineers in coordination with URS Group, Inc., under Contract No. 68-W-98-228 for EPA Region 10. Seattle, Washington. June 2004.
- . 2004b. *Final Cleanup Final Management Plan, Pacific Sound Resources Superfund Site, Marine Sediments Unit*. Prepared by U.S. Army Corps of Engineers in coordination with URS Group, Inc., under Contract No. 68-W-98-228 for EPA Region 10. Seattle, Washington. June 2004.

Figures

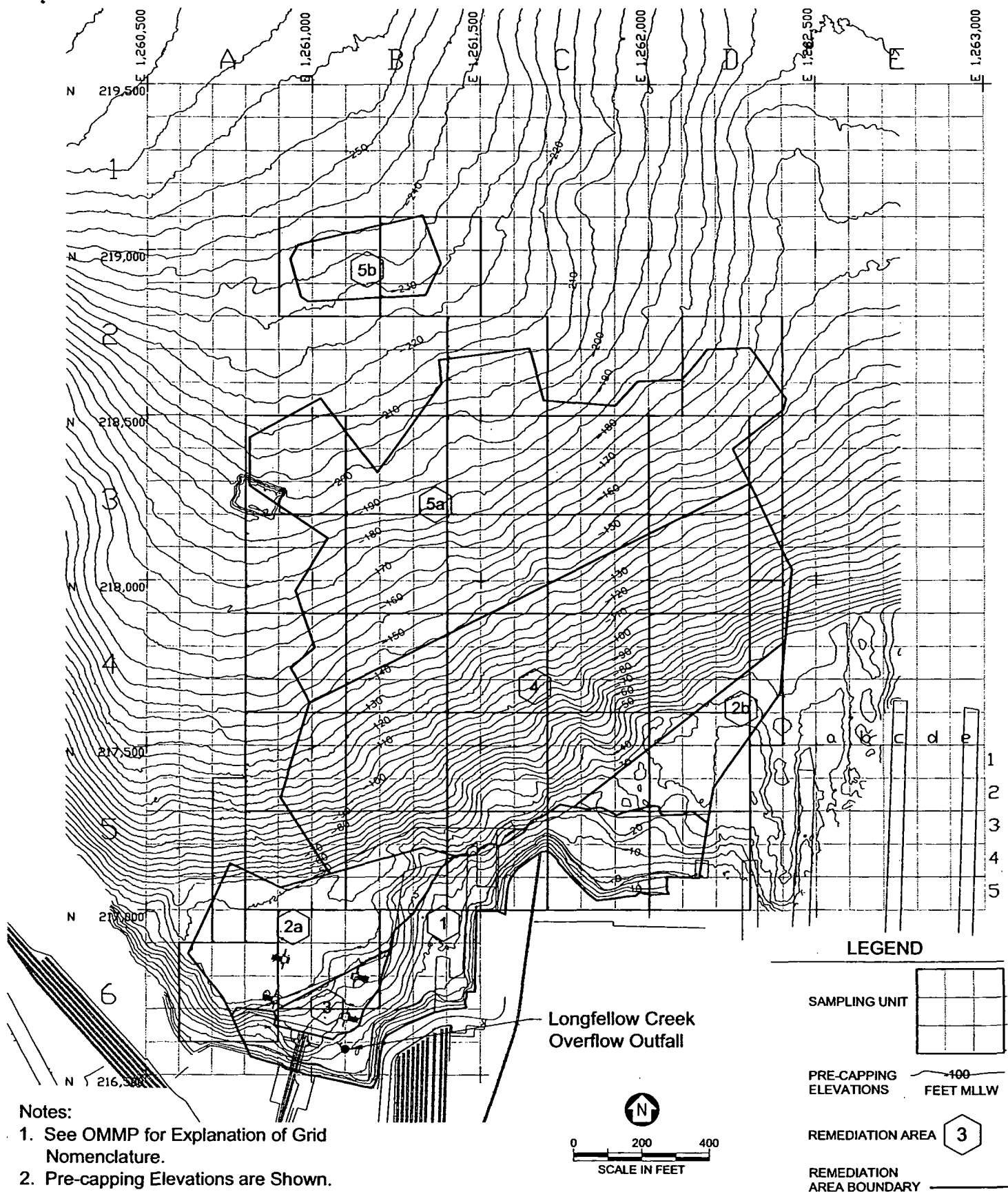
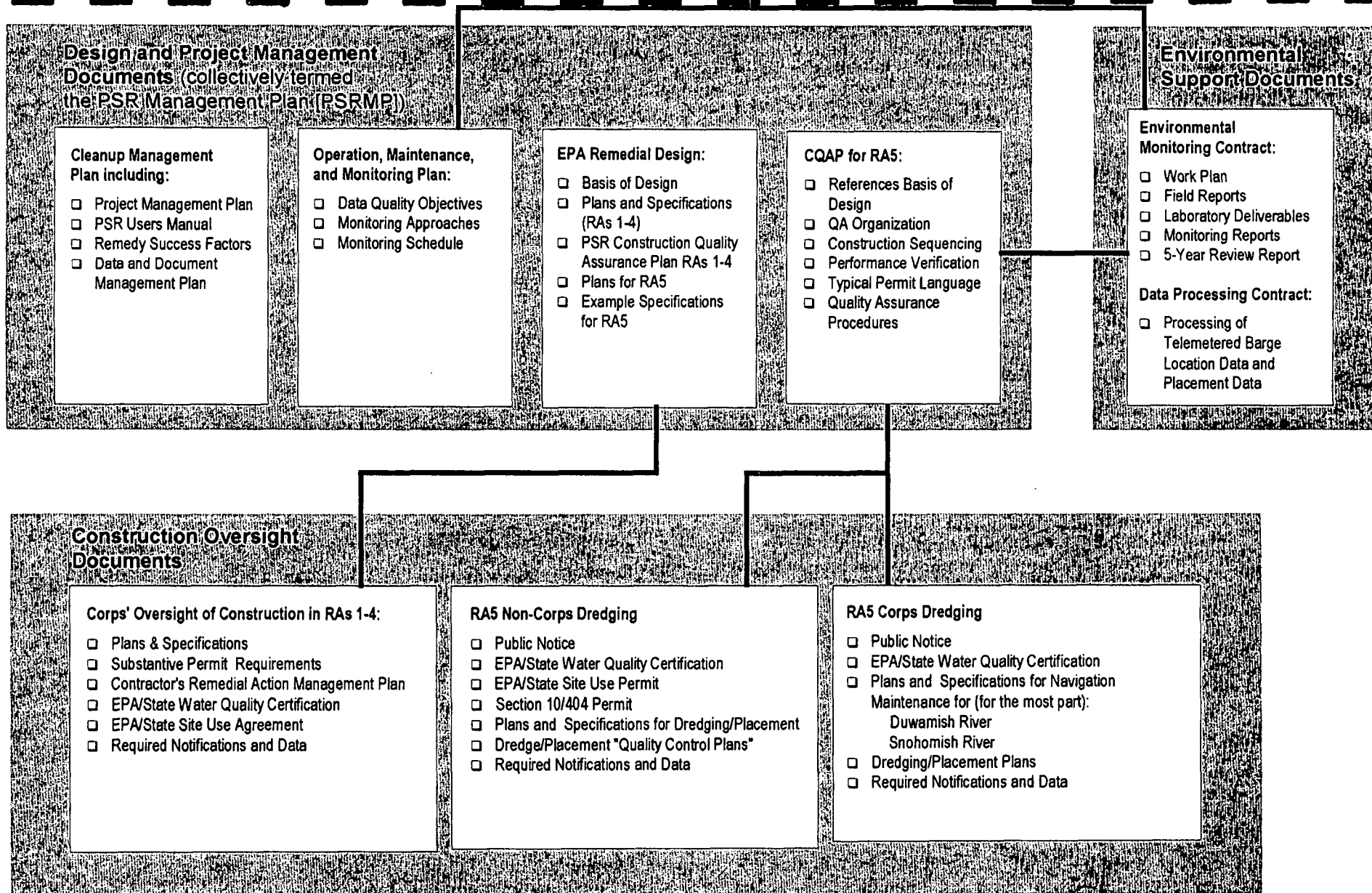


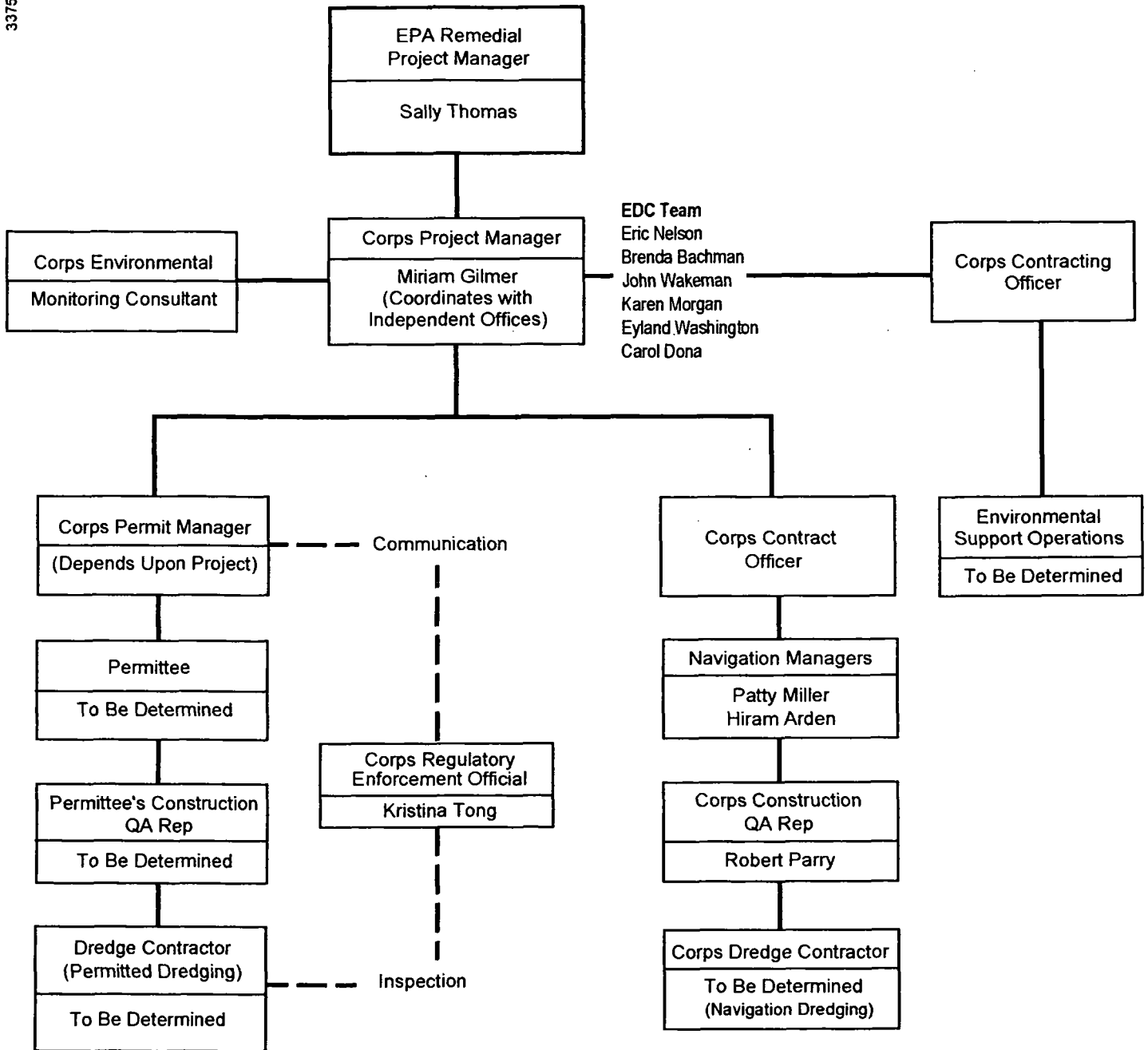
Figure 1
PSR MSU SITE MAP

114-RD-RD-101L
PSR SUPERFUND SITE

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EPA
REGION 10

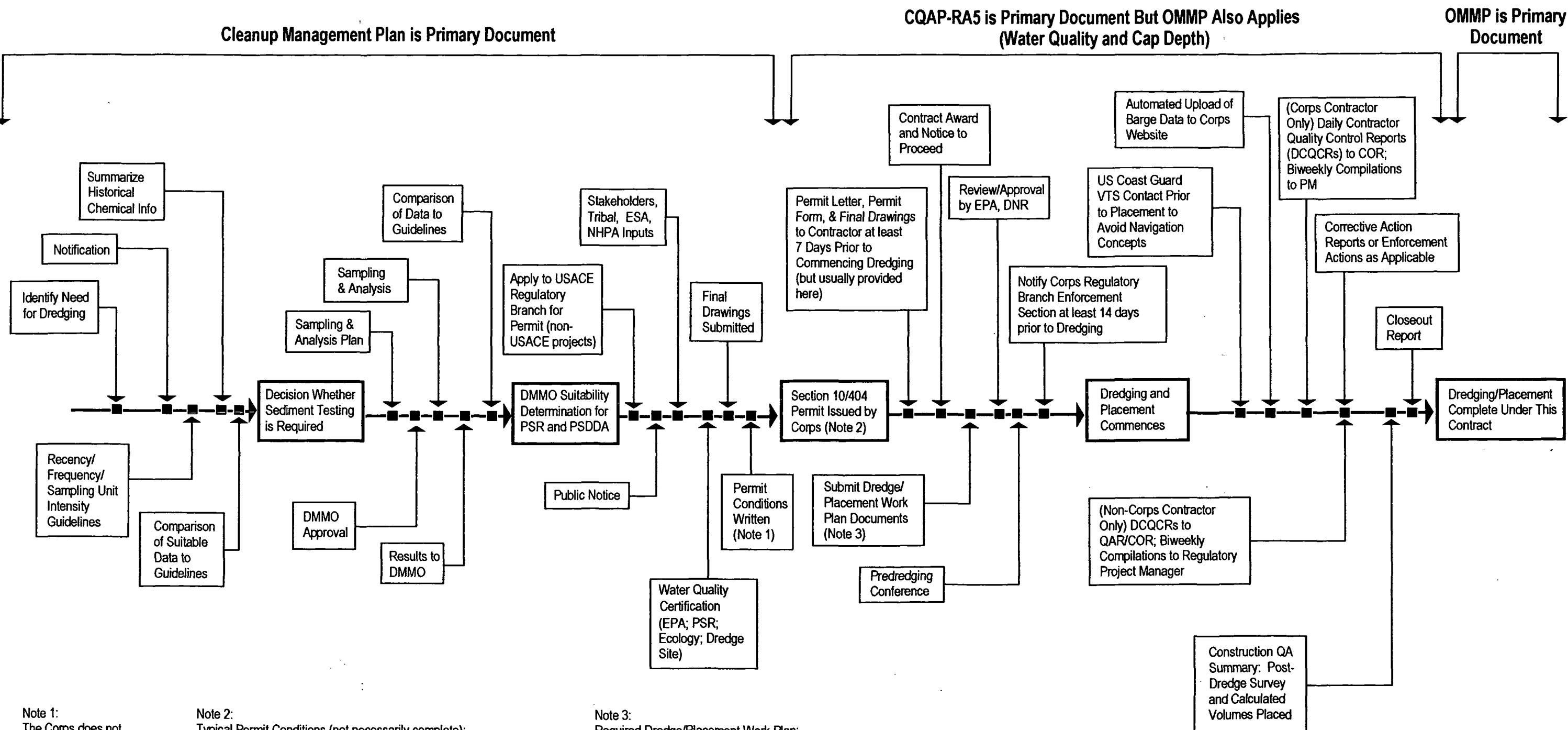




Note: Annual monitoring covered under the OMMP is not shown.

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Figure 3 Quality Assurance Organization to Support Remediation in RA5



Note 1:
The Corps does not issue itself a permit, but uses substantive permit conditions

Note 2:
Typical Permit Conditions (not necessarily complete):

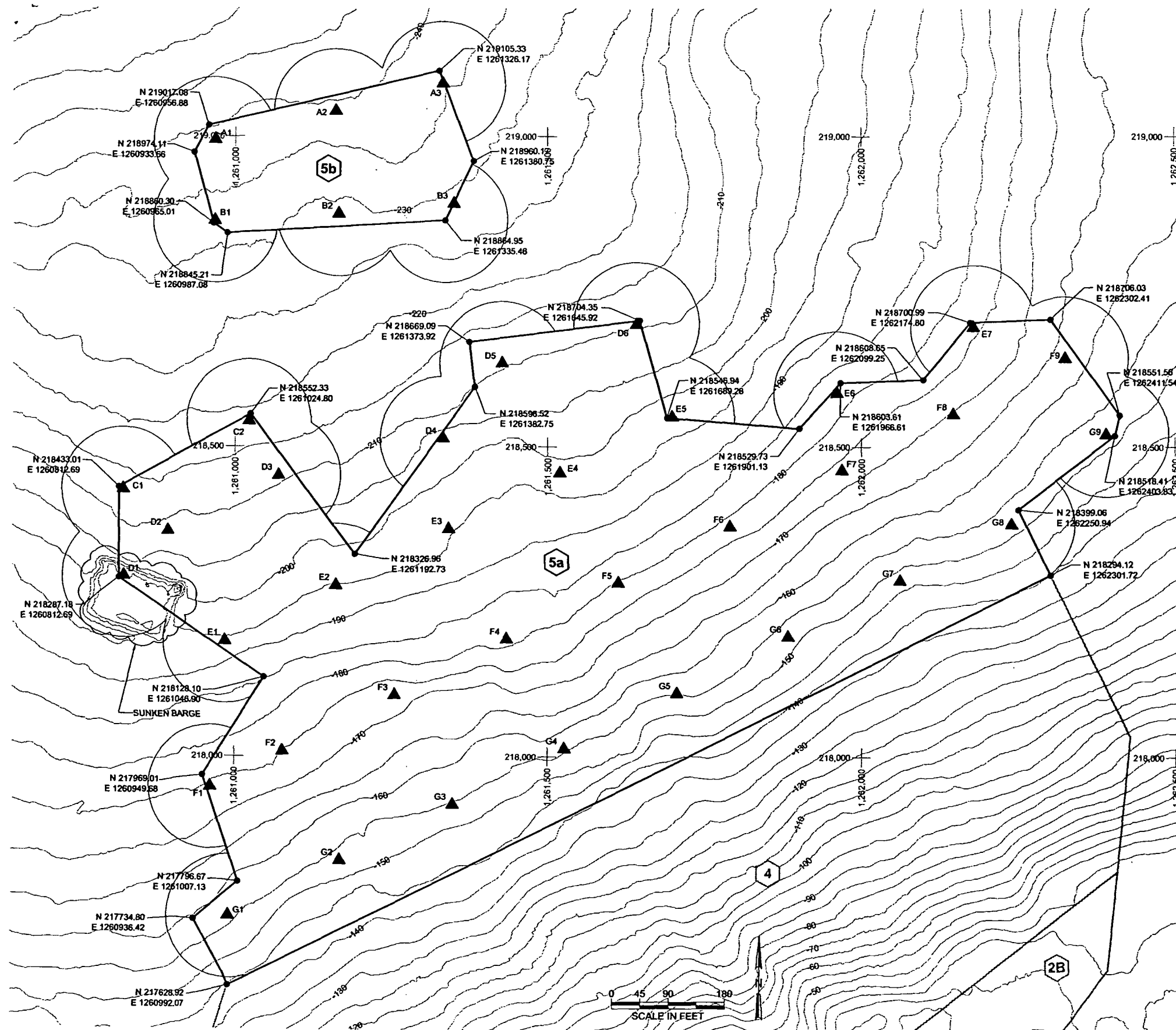
- Differential Global Information System with barge release automated data acquisition required for use at PSR Site: automated data upload to website
- Printed coordinates for open and close of barge; Tug Captain to sign each record
- Daylight hours dumping only during Indian Tribal Fishing period
- Nighttime hours coordinated with Regulatory Enforcement Official
- USCG COMOT INST M 16672.2A International-Inland; December 23, 1983, shall apply at all times. Notify USCG Vessel Traffic Service at least 14 days prior to dredging in order to assure that a Notice To Mariners is made.

Note 3:
Required Dredge/Placement Work Plan:

- Dredging/Placement Work Plan (sometimes called "Dredge QC Plans" in permits)
- Accident Prevention Plan and Activity Hazard Analysis
- Sampling and Analysis Plan for Dredging Site
- Contractor's Quality Control Plan including Project Schedule and Statement of Qualifications
- Environmental Protection Plan
- Spill Prevention and Emergency Response Plan

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Figure 4
Process Diagram for Permitting, Dredging, and Placement at PSR RA5



NOTES

1. RAS CAP MATERIAL SHALL CONFORM TO THE REQUIREMENTS FOR "DREDGED CAP MATERIAL" AS DEFINED IN THE FINAL DESIGN SUBMITTAL, APPENDIX F.
2. ALL DREDGED MATERIAL SHALL BE PLACED BY BOTTOM-DUMP BARGE.
3. CENTER OF BARGE SHALL BE WITHIN 100 FT OF TARGET COORDINATES AT TIME OF OPENING.
4. THE FIRST PLACEMENT EVENT AT EACH TARGET LOCATION SHALL NOT EXCEED 1,500 CY. SUBSEQUENT PLACEMENT EVENTS MAY EXCEED 1,500 CY AT A- THROUGH F-SERIES TARGET LOCATIONS. SUBSEQUENT PLACEMENT EVENTS SHALL NOT EXCEED 1,500 CY AT G-SERIES TARGET LOCATIONS.
5. HORIZONTAL DATUM: WASHINGTON COORDINATE SYSTEM NORTH ZONE, NAD 83. BASED UPON NGS CONTROL POINT AT DUWAMISH (PID SY4595).
6. VERTICAL DATUM: MLLW, US SURVEY, FEET.
7. TIDAL DATUM LOCATION: NOS STATION 9447130 ELLIOTT BAY SEATTLE, WA.
8. BASE MAPS HAVE BEEN DEVELOPED BASED ON BATHYMETRIC SURVEYS PERFORMED BY NOAA OFFICE OF COAST SURVEY IN MARCH 2001 AND PARAMETRIX IN SEPTEMBER 2001, AND ON A LAND SURVEY PERFORMED BY PARAMETRIX IN FALL 2001.
9. ALL QUANTITIES ARE EXPRESSED AS BARGE-MEASURE (BULK) VOLUME.
10. REFER TO PSRMP FOR CONSTRUCTION QUALITY CONTROL REQUIREMENTS.

RA5 PLACEMENT PLAN

COUNT	TARGET LOCATION	NORTHING	EASTING	REQUIRED QUANTITY (CY)	PLACEMENT SEQUENCE
1	A1	218994.34	1260967.82	5,500	Phase II
2	A2	219040.63	1261182.39	5,500	Phase II
3	A3	219084.75	1261331.99	5,500	Phase II
4	B1	218884.60	1260967.25	5,500	Phase II
5	B2	218875.88	1261166.83	5,500	Phase II
6	B3	218892.10	1261348.33	5,500	Phase II
7	C1	218428.68	1260819.29	5,500	Phase II
8	C2	218541.06	1261022.42	5,500	Phase II
9	D1	218290.10	1260820.40	5,500	Phase II
10	D2	218383.02	1260891.63	4,500	Phase II
11	D3	218453.60	1261068.98	5,500	Phase II
12	D4	218513.28	1261331.88	5,500	Phase II
13	D5	218534.78	1261426.82	5,500	Phase II
14	D6	218597.81	1261841.30	5,500	Phase II
15	E1	218185.84	1260984.44	5,500	Phase II
16	E2	218278.42	1261162.77	4,500	Phase II
17	E3	218367.00	1261341.10	4,500	Phase II
18	E4	218457.58	1261519.43	4,500	Phase II
19	E5	218548.18	1261697.77	5,500	Phase II
20	E6	218588.38	1261960.81	5,500	Phase II
21	E7	218693.04	1262179.59	5,500	Phase II
22	F1	217950.04	1260961.83	5,500	Phase I
23	F2	218008.67	1261077.28	4,500	Phase I
24	F3	218099.25	1261255.59	4,500	Phase I
25	F4	218189.82	1261433.92	4,500	Phase I
26	F5	218280.40	1261612.25	4,500	Phase I
27	F6	218370.98	1261790.58	4,500	Phase I
28	F7	218461.56	1261968.91	4,500	Phase I
29	F8	218552.14	1262147.24	4,500	Phase I
30	F9	218642.72	1262325.57	5,500	Phase I
31	G1	217740.91	1260991.75	5,500	Phase I
32	G2	217831.49	1261170.08	4,500	Phase I
33	G3	217922.07	1261348.41	4,500	Phase I
34	G4	218012.65	1261526.74	4,500	Phase I
35	G5	218102.48	1261705.47	4,500	Phase I
36	G6	218193.81	1261883.40	4,500	Phase I
37	G7	218284.39	1262061.73	4,500	Phase I
38	G8	218374.97	1262240.06	5,500	Phase I
39	G9	218465.77	1262418.39	5,500	Phase I
TOTAL				187,500	

LEGEND

ABBREVIATIONS

CY CUBIC YARDS
MLLW MEAN LOWER LOW WATER
IN INCHES
NTS NOT TO SCALE
PSRMP PACIFIC SOUND RESOURCES MANAGEMENT PLAN

-20- ELEVATIONS IN FEET MLLW
REMEDIATION AREA BOUNDARIES FOR RA5
RA BOUNDARIES FOR OTHER CAP AREAS
5 REMEDIATION AREA
▲ BOTTOM-DUMP TARGET LOCATION
DREDGED MATERIAL

NOTE:

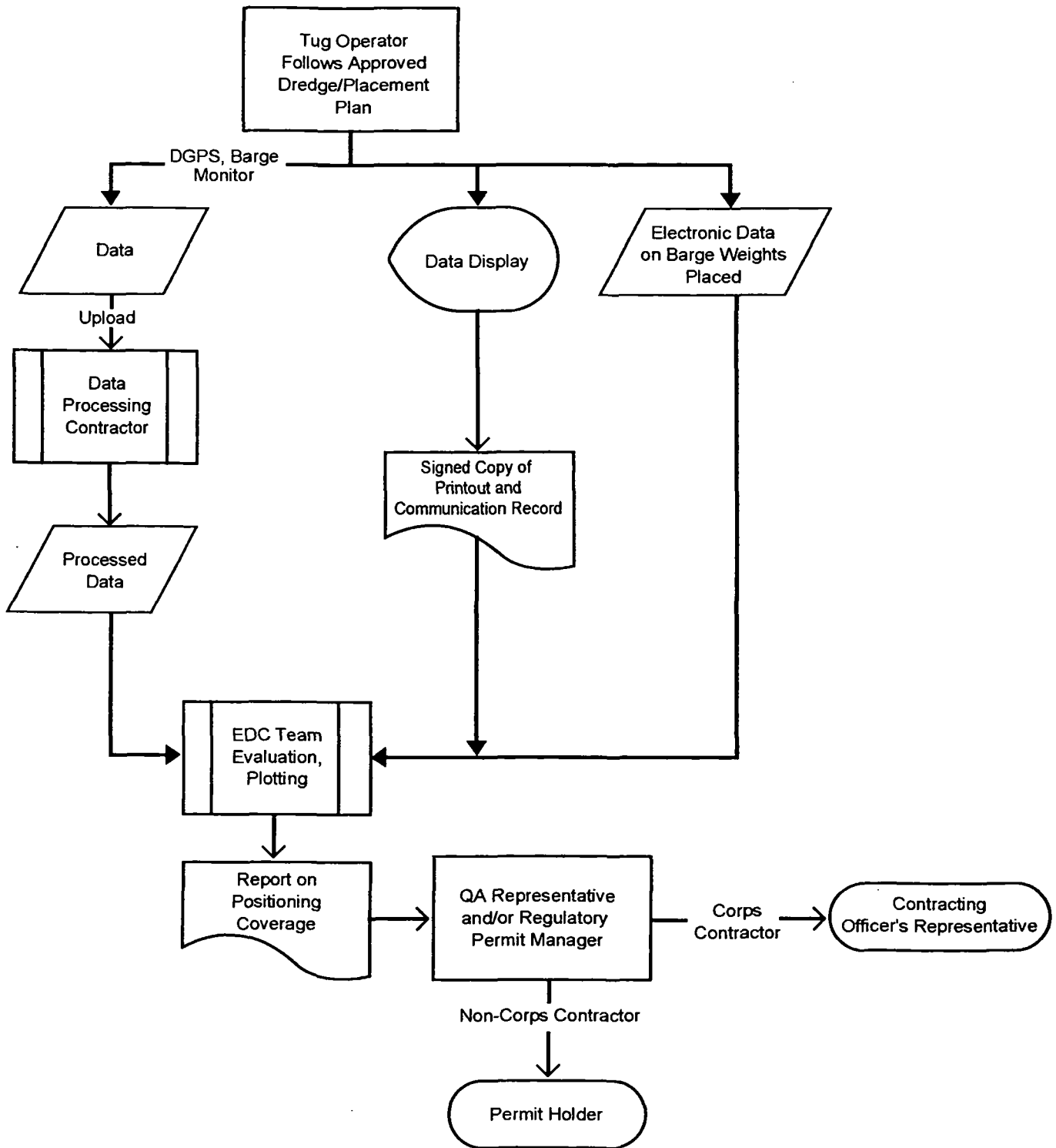
1. FIGURE ADAPTED FROM FINAL RD, APPENDIX F, PLATE C-1 (USEPA 2003a). THIS FIGURE IS NOT A DESIGN DRAWING.
2. THE 100-FOOT RADIUS SEMICIRCLES INDICATE THE ALLOWABLE MARGINS.

FILENAME: T:\RAC\PSR\Sub-Tasks\PSRMP\FIG 5 CAP PLACE.dwg
EDIT DATE: 06/24/04 AT: 13:02

EPA
REGION 10

Figure 5
ALLOWABLE MARGINS FOR CAP PLACEMENT IN RA5

114-RD-RD-101L
PSR SUPERFUND SITE



Note: Information flow during quality assurance shown on Figure 3

Job No. 33755785

Figure 6 Data Flow and Communications Plan for PSR RA5

TABLES

Table 1
USACE Lead Branches by Contractor and Activity

USACE Lead Branch	Contractor	Remedial Activity	Guiding Documents
Operations Division, Navigation & Plant Branch	USACE Dredging Contractor	<ul style="list-style-type: none"> • Dredging and capping • Environmental compliance 	<ul style="list-style-type: none"> • Plans and specifications for navigation dredging • CQAP-RA5
Operations Division, Regulatory Enforcement Branch	Non-USACE Dredging Contractor	<ul style="list-style-type: none"> • Dredging and capping • Environmental compliance 	<ul style="list-style-type: none"> • Permit • Plans and specifications from permit holder • CQAP-RA5
Engineering/Construction Division, Technical Services and Design Branches	Environmental Monitoring Contractor	<ul style="list-style-type: none"> • Monitoring of bathymetry and cap thickness after construction activities • Monitoring of water quality at PSR site during placement • Contracting for Environmental Services Contract (includes Beach Vegetation and Maintenance) 	<ul style="list-style-type: none"> • Scope of Work for Environmental Services Contract • Approved Sampling and Analysis Plan • PSR OMMP • PSR CQAP-RA5 • Work Plans for Vegetation/Maintenance

Table 2
PSR RA5 Construction Quality Assurance Team Organization

Role	Primary Point of Contact	Telephone No.	Alternate Point of Contact	Telephone No.	Responsibilities
EPA					
RPM—Marine Sediment Unit	Sally Thomas	(206) 553- 2102	To be determined		See Section 3.1.
USACE Project Management					
Project Manager	Miriam Gilmer	(206) 764-6587			See Section 3.2.
Engineering During Construction Team					
Biologist	John Wakeman	(206) 764-3430	Brenda Bachman	(206) 764-3524	<ul style="list-style-type: none"> Contracting Officer's Representative for Environmental Support Contract Prepares Construction Quality Assurance Plan Oversees monitoring contract for coring and bathymetry
Chemist	Sandy Lemlich	(206) 764-6930			<ul style="list-style-type: none"> Prepares and monitors contract to acquire and evaluate chemical data (in OMMP)
Chemical Engineer	Carol Dona	(206) 764-3514			<ul style="list-style-type: none"> Prepares and monitors contract to receive and evaluate bathymetry data (in OMMP)
Coastal Engineer	Eric Nelson	(206) 764-3557	Lisa Lejon Pat Naher	(206) 764-3420 (206) 764-3420	<ul style="list-style-type: none"> Provides input to cap placement construction plans and specifications Analyzes bathymetric data during cap construction

Table 2 (Continued)
PSR RA5 Construction Quality Assurance Team Organization

Role	Primary Point of Contact	Telephone No.	Alternate Point of Contact	Telephone No.	Responsibilities
Coastal Engineer (Cont.)					<ul style="list-style-type: none"> Coordinates/communicates with the QA representative, PM, regulatory enforcement official, and navigation personnel to manage material placement Prepares weekly QA and data evaluation reports for EPA, QAR, and Regulatory Project Manager
Contracting QA					
Contracting Officer	Sharon Gonzalez	(206) 764-6696			See Section 3.3.
Civil Engineer	Robert Parry	(206) 764-3400	To be determined		<ul style="list-style-type: none"> Contracting Officer's Representative for navigation projects Quality Assurance Representative for USACE navigation dredging Accomplishes inspections and submittals, approves work plans
Regulatory Project Manager	Kristina (Tina) Tong	(206) 764-6913	Depends upon project		<ul style="list-style-type: none"> Oversees regulatory inspection and enforcement for permitted dredging projects Approves work plans and submittals

Table 2 (Continued)
PSR RA5 Construction Quality Assurance Team Organization

Role	Primary Point of Contact	Telephone No.	Alternate Point of Contact	Telephone No.	Responsibilities
Civil Engineer	Patricia Miller	(206) 764-6908	To be determined		<ul style="list-style-type: none">• Prepares cap placement construction plans and specifications for Snohomish and Duwamish Rivers• Coordinates contract issues with the Construction Quality Assurance Representative and Engineering during construction• Reviews submittals (work plans, etc.)
Civil Engineer	Hiram Arden	(206) 764-3401	To be determined		<ul style="list-style-type: none">• Prepares cap placement construction plans and specifications for Swinomish Channel• Coordinates contract issues with the Construction Quality Assurance Representative and Engineering during construction• Reviews submittals (work plans, etc.)

Table 3
Data Quality Objectives for Construction Quality Assurance

Reference, Paragraph (P.) or Specification (S.)	Potential Quality Control Concern	Related Decision or Action	Measurement	Precision	Frequency/Intensity of Testing
P. 4.3	Navigation conflicts	USCG and USACE Regulatory Project Manager must be notified on avoidance of navigation conflicts at least 14 days before dredging/disposal.	Paper trail	Not applicable	Once, at start
S. 02483	Horizontal positioning	DGPS is inadequate for positioning barge.	Latitude/longitude/or northing/easting	Horizontal: ± 10 meters (33 feet)	Contractor demonstrates precision during Pre- dredge Conference or once at startup
S. 02483	Electronic data logger data do not meet format or quality required	Data may be unusable for positioning.	Automated QA review by environmental support contractor	Data >95% usable	Every batch, as delivered
S. 02483	Volumes placed (spreadsheet) incomplete	Contractor must document all placement by target.	QA check of spreadsheet	Not applicable	With DCQCRs
S. 02483 P. 5.2	Placement outside 100-foot zone	<ul style="list-style-type: none"> Adjustment of loading; see Section 5.2 Determination of noncompliance 	Location of barge opening	See Horizontal positioning above	Each barge load

Table 3 (Continued)
Data Quality Objectives for Construction Quality Assurance

Reference, Paragraph (P.) or Specification (S.)	Potential Quality Control Concern	Related Decision or Action	Measurement	Precision	Frequency/Intensity of Testing
S. 02483	Tribal fishing conflicts	CO or permit holder must coordinate with affected Tribes.	Paper trail	Not applicable	Continuous throughout project
S. 01355	Petroleum spills	If caused by contractor, he must initiate emergency response.	Any evidence of release	Not applicable	As needed
S. 01355	Creosote releases from bottom	Notification to EPA On-Scene Coordinator and National Spill Response Team	50 by 50 feet, persistent for more than 10 minutes	±10 feet	As needed
S. 02483	Water quality exceedances at or greater than 300 feet from point of placement; see OMMP for details	In violation of water quality permit	Nephelometric turbidity and dissolved oxygen	See OMMP	To be determined by Water Quality Certification; proposed as initially twice a week for 2 weeks with reassessment of frequency according to results

Table 4
Washington State Sediment Quality Standards

Chemical or Chemical Group	Required for Cap Confirmation?	SQS (mg/kg dry weight)	Lowest Apparent Effects Threshold ^a (mg/kg dry weight)
Metals			
Arsenic	No	57	57
Cadmium	No	5.1	5.1
Chromium	No	260	260
Copper	Yes	390	390
Lead	No	450	450
Mercury	Yes	0.41	0.41
Silver	No	6.1	
Zinc	Yes	410	410
		(mg/kg organic carbon normalized)	(mg/kg dry weight)
Organic Compounds			
Total LPAH	Yes	370	5.2
Naphthalene	Yes	99	2.1
Acenaphthylene	Yes	66	1.3
Acenaphthene	Yes	16	0.5
Fluorene	Yes	23	0.54
Phenanthrene	Yes	100	1.5
Anthracene	Yes	220	0.96
2-Methylnaphthalene	Yes	38	0.87
Total HPAH	Yes	960	12
Fluoranthene	Yes	160	1.7
Pyrene	Yes	1,000	2.6
Benz(a)anthracene	Yes	110	1.3
Chrysene	Yes	110	1.4
Total benzo(a)fluoranthenes	Yes	230	3.2
Benzo(a)pyrene	Yes	99	1.6
Indeno(1,2,3-c,d)pyrene	Yes	34	0.6
Dibenzo(a,h)anthracene	Yes	12	0.23
Benzo(g,h,i)perylene	Yes	31	0.67
1,2-Dichlorobenzene	No	2.3	
1,4-Dichlorobenzene	No	3.1	
1,2,4-Trichlorobenzene	No	0.81	
Hexachlorobenzene	No	0.38	

Table 4 (Continued)
Washington State Sediment Quality Standards

Chemical or Chemical Group	Required for Cap Confirmation?	SQS (mg/kg organic carbon normalized)	Lowest Apparent Effects Threshold^a (mg/kg dry weight)
Organic Compounds (Continued)			
Dimethylphthalate	No	53	
Diethylphthalate	No	61	
Di-n-butylphthalate	No	220	
Butylbenzylphthalate	No	4.9	
Bis(2-ethylhexyl)phthalate	No	47	
Di-n-octylphthalate	No	58	
Dibenzofuran	Yes	15	0.54
Hexachlorobutadiene	No	3.9	
n-Nitrosodiphenylamine	No	11	
Total PCBs	Yes	12	0.13
Phenol	Yes	420	0.42
2-Methylphenol	Yes	63	0.063
4-Methylphenol	Yes	670	0.67
2,4-Dimethylphenol	Yes	29	0.029
Pentachlorophenol	Yes	360	0.36
Benzyl alcohol	No	57	
Benzoic acid	No	650	
Chlorinated dioxins, furans	Footnote b	Not specified	Not specified

^aWashington State Department of Ecology typically uses dry-weight basis concentrations to determine compliance with SQS outside of the range of 0.5–4% total organic carbon.

^bPCDD/F compounds will not be monitored, as explained in the text.

Table 5
Supporting Data for Derivation of Adjustment Factors for Off-Target Dumps

Distance From Target	Modeled Mound Height		Volume to be Credited to Target
	Highest Fraction	Lowest Fraction	
Conforming Placement (within 100 feet of target)			
0–100 feet	1.0	0.6	100% of dump volume
Nonconforming Placement, Outside Cap Boundaries			
100–150 feet	0.6	0.33	33% of dump volume
>150 feet	0.33	Not applicable	0% of dump volume
Nonconforming Placement, Within Cap Boundaries			
>100 feet	—	—	Assign 100% to nearest target

This table shows recommended "credit" for nonconforming placement intervals. For example, if 1,000 cubic yards of material were placed 150 feet from the target and outside the cap boundaries, the volume credited to the target would be 330 cubic yards. For placement greater than 150 feet, no volume would be credited to the target. These factors are based on the figure below, which depicts results of STFATE modeling in RA5 in the RD (USEPA 2003a).

Mound Thickness as a Function of Distance From Target

